

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of: Peltola)	CUSTOMER NO. 71130
)	
Serial No.: 10/568792)	Group Art Unit: 3752
)	
Filed: February 17, 2006)	Confirmation No.: 6422
)	
Title: METHOD AND EQUIPMENT FOR)	Examiner: Steven Michael Cernoch
)	
FIRE FIGHTING)	
)	
Attorney Docket No.: 37888-400200)	
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APPEAL BRIEF

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This is an appeal from the decision of the Primary Examiner, December 9, 2009 finally rejecting claims 1-15 (the "Office Action"). A Notice of Appeal was filed on February 24, 2010.

Appellants hereby petition under 37 C.F.R. §136(a) for a two month extension of time for filing this Appeal Brief.

Authorization is hereby given to charge \$490 for the filing of the present Appeal Brief, and any additional fees, to Deposit Account No. 502896, and credit any overpayment thereto.

I. REAL PARTY IN INTEREST

The present application is assigned to Bronto Skylift Oy AB, principal place of business in Tempere, Finland F1-33300.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF CLAIMS

Claims 1-15 are pending in the application.

Claims 1-15 are finally rejected.

Claims 1-15 are appealed, and are set forth in the Claims Appendix.

IV. STATUS OF AMENDMENTS

All amendments have been entered. Formal drawings were filed and accepted.

No amendments to the claims are made herein.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention is *inter alia* a method for fire-fighting, the method comprising: piercing a shell (8) of a burning object by pushing at least one elongated piercing tool (7) arranged in a rescue boom (3) from the side (8a) of a first surface of the shell (8) to the side (8b) of a second surface thereof, feeding, along at least one longitudinal channel in the piercing tool (7), a fire extinguishing medium to a nozzle (12) provided in the piercing tool (7), spraying the

fire extinguishing medium to the side (8b) of the second surface of the shell (8) through a plurality of orifices (17) provided in the nozzle (12). See Figs. 1 - 3, spec. p. 1, lines 3-10.

The invention further relates to a rescue boom (3) comprising: a boom (3) provided with at least one movable boom part (5a, 5b) connected to a base (2), at least one piercing tool (7) arranged at a free end of the boom (3), the piercing tool (7) being an elongated piece comprising at least one longitudinal channel, at least one actuator (34) for moving the piercing tool (7) in the longitudinal direction of the piercing tool (7) with respect to an outermost end of the boom (3), at least one feed channel (11) for feeding a fire extinguishing medium to the channel in the piercing tool (7), at least one nozzle (12), which is an elongated piece and which is connected to the channel in the piercing tool (7), the fire extinguishing medium being arranged to be fed through a plurality of orifices (17) provided in the nozzle (12), and wherein the longitudinal cross section of the nozzle (12), the orifices (17) in the nozzle (12). See Figs. 1 - 3, spec. p. 1, lines 11-20.

The invention still further relates to a nozzle of a piercing tool (7) for spraying a fire extinguishing medium, the nozzle (12) being an elongated piece having a front end and a rear end and the nozzle (12) comprising: fastening means at the rear end of the nozzle (12) for fastening the nozzle (12) to the piercing tool (7), at least one feed channel (11) for feeding a fire extinguishing medium to the nozzle (12), a plurality of orifices (17) extending from the feed channel (11) to an outer surface of the nozzle (12), the orifices (17) being directed obliquely forwards such that the farther away from the front end of the nozzle (12) a single orifice resides, the larger an acute angle between the middle axis (18) of the orifice and the middle axis (28) of the nozzle (12). See Figs. 1 - 3, spec. p. 1, lines 21-30.

Independent claim 1 recites:

1. (Previously presented) A method for fire-fighting, the method comprising:
piercing a shell (8) of a burning object by pushing at least one elongated piercing tool (7)
arranged in a rescue boom (3) from the side (8a) of a first surface of the shell (8) to the side (8b)
of a second surface thereof,
feeding, along at least one longitudinal channel in the piercing tool (7), a fire
extinguishing medium to a nozzle (12) provided in the piercing tool (7),
spraying the fire extinguishing medium to the side (8b) of the second surface of the shell
(8) through a plurality of orifices (17) provided in the nozzle (12),
and directing a plurality of single jets (20) expelled from the orifices (17) so that they
intersect one another to form a single uniform jet (13) having a flat curtain-like shape.

Independent claim 5 recites:

5. (Previously presented) A rescue boom (3) comprising:
a boom (3) provided with at least one movable boom part (5a, 5b) connected to a base
(2),
at least one piercing tool (7) arranged at a free end of the boom (3), the piercing tool (7)
being an elongated piece comprising at least one longitudinal channel,
at least one actuator (34) for moving the piercing tool (7) in the longitudinal direction of
the piercing tool (7) with respect to an outermost end of the boom (3),
at least one feed channel (11) for feeding a fire extinguishing medium to the channel in
the piercing tool (7),

at least one nozzle (12), which is an elongated piece and which is connected to the channel in the piercing tool (7), the fire extinguishing medium being arranged to be fed through a plurality of orifices (17) provided in the nozzle (12),

and wherein the longitudinal cross section of the nozzle (12), the orifices (17) in the nozzle (12) are arranged to pass via substantially the same imaginary plane so that the fire extinguishing medium fed through the orifices (17) forms a plurality of single jets (20) which intersect one another to form a single uniform jet (13) having a flat curtain-like shape.

Independent claim 7 recites:

7. (Previously presented) A nozzle of a piercing tool (7) for spraying a fire extinguishing medium, the nozzle (12) being an elongated piece having a front end and a rear end and the nozzle (12) comprising:

fastening means at the rear end of the nozzle (12) for fastening the nozzle (12) to the piercing tool (7),

at least one feed channel (11) for feeding a fire extinguishing medium to the nozzle (12),
a plurality of orifices (17) extending from the feed channel (11) to an outer surface of the nozzle (12), the orifices (17) being directed obliquely forwards such that the farther away from the front end of the nozzle (12) a single orifice resides, the larger an acute angle between the middle axis (18) of the orifice and the middle axis (28) of the nozzle (12)

and wherein the longitudinal cross section of the nozzle (12), the orifices (17) are arranged to pass via substantially the same imaginary plane so that the fire extinguishing medium

fed through the orifices (17) forms a plurality of single jets (20) which intersect one another to form a single uniform jet (13) having a flat curtain-like shape.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following rejections are presented for review.

The Examiner rejected claims 1-6, and 14-15 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,301,756 to Relyea et al. (hereinafter “Relyea”) in view of U.S. Patent No. 5,921,472 to Haruch et al. (“Haruch”).

The Examiner rejected claims 7-10 under 35 U.S.C. §103 over Relyea in view of U.S. Patent No. 3,913,845 to Tsuji (hereinafter “Tsuji”) and further in view of Haruch.

The Examiner rejected claim 11 under 35 U.S.C. §103(a) over Relyea in view of Tsuji and Haruch and U.S. Patent No. 2,246,797 to Geddes et al. (hereinafter “Geddes”) and rejected claims 12 – 13 under 35 U.S.C. §103(a) over Relyea in view of Tsuji, Haruch, Geddes and U.S. Patent No. 4,435,891 to Nicholson et al. (hereinafter “Nicholson”).

VII. ARGUMENT

A. The Rejections Under 35 U.S.C. §103(a) over U.S. Patent No. 5,301,756 to Relyea et al. in view of U.S. Patent No. 5,921,472 to Haruch et al. are Improper Because No Combination of Relyea and Haruch Teaches or Suggests Each and Every Claim Element.

In the Final Office Action dated December 9, 2009, the Examiner rejected claims 1-6, and 14-15 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,301,756 to Relyea et al. (hereinafter “Relyea”) in view of U.S. Patent No. 5,921,472 to Haruch et al.

(“Haruch”). Each of the rejected claims requires a method or apparatus which directs a plurality of single jets from a plurality of orifices so that they intersect one another to form a single uniform jet having a flat curtain like shape. The rejections under 35 U.S.C §103(a) are improper for at least the reason that neither Relyea nor Haruch nor of the cited references, alone or combined, teaches or suggests this claim element.

The Examiner admitted that “Relyea et al. does not teach directing a plurality of single jets expelled from the orifices so that they intersect one another to form a single jet having a flat curtain-like shape.” Office Action, page 3, lines 4 – 6. However, the Examiner erroneously asserted that “Haruch et al. does teach directing a plurality of single jets expelled from the orifices so that they intersect one another (Fig. 1, 25) to form a single uniform jet having a flat curtain like shape (col. 1, lines 22 – 23). Office Action, page 3, lines 7 – 9. This assertion is simply incorrect.

Appellant respectfully submits that, contrary to the Examiner’s characterization, col. 1, lines 22 -23 of Haruch describe a nozzle disclosed in U.S. Patent No. 5,306,418 to Dou et al. (hereinafter “Dou”) which Haruch incorporates by reference. The cited portion of Haruch recites “[i]n the apparatus of the Dou et al [sic] patent, the preferred discharge nozzle has a generally hemispherical discharge end which is formed with a single elongated slot-like orifice adapted to produce a flat fan-shaped spray.” Col. 1, lines 19 – 24, emphasis added. Appellant submits that the single elongated slot of Dou does not teach or suggest anything about “a plurality of single jets” and in fact teaches away from using “a plurality of single jets expelled from the orifices so that they intersect one another to form a single uniform jet having a flat curtain-like shape” as particularly claimed.

Furthermore, Haruch’s reference to the Dau et al. patent is set forth in the Background of the Invention section of Haruch’s disclosure as an example of a previously known apparatus for atomizing a liquid feed to a fluidized catalytic cracking reactor. (Col. 1, lines 11 - 17). Nowhere does Haruch state or imply that Haruch’s disclosed invention includes any particular elements disclosed by Dou et al. Rather, Haruch merely points to the Dau et al. patent as a disclosure of the particular use of an apparatus of the same general type. See col. 2, lines 36 - 39.

Appellant further respectfully submits that, contrary to the Examiner’s characterization, Fig. 1, item 25 of Haruch does not teach or suggest “a plurality of single jets expelled from the

orifices so that they intersect one another to form a single uniform jet having a flat curtain-like shape” as claimed. Rather, Haruch recites:

“In accordance with the present invention, the discharge end 22 of the nozzle 20 is formed with a plurality of discharge orifices 25 which are located on opposite sides of the axis of the nozzle and which are elongated in a direction extending transversely of the axis. By virtue of the discharge end of the nozzle having a plurality of outlet orifices, the mixture discharged from the nozzle is atomized more finely than is the case of a nozzle having a single discharge orifice of comparable area centered on the axis of the nozzle. As a result of the finer atomization effected by the multiple orifices, the efficiency of the apparatus 10 is increased in that a given volume of liquid may be broken into particles having a relatively high surface area even though steam is supplied to the apparatus at a comparatively low volumetric flow rate.

In the embodiment of FIGS. 1 and 2, two elongated outlet orifices 25 are formed in the discharge end 22 of the nozzle 20. The orifices are located on opposite sides of and are spaced equidistantly from the axis of the nozzle and, as pointed out above, are elongated in a direction extending transversely of the nozzle. FIGS. 1 and 2 represent one embodiment in which, the orifices 25 are angled toward one another so as to cause the streams sprayed from the nozzle to converge upon progressing away from the discharge end of the nozzle. In this way, the streams impact against one another to effect still further atomization immediately outside the nozzle. Each orifice preferably is inclined at an angle up to about ten degrees relative to the axis of the nozzle.” Col. 3, lines 6 – 36, emphasis added.

Thus, Haruch is directed to increasing the efficiency of atomizing a liquid flow, and does teach or suggest forming a single uniform jet having a flat curtain like shape. Further, Appellant submits that because discharge orifices 25 of Haruch are elongated, the discharge streams emitted therefrom are not in the form of jets as particularly claimed.

In the Final Office Action, the Examiner also asserted “Regarding applicant’s argument that Haruch does not disclose a flat spray except for the incorporation by reference of the Dou disclosure... it is also disclosed in the abstract of Haruch on line 7.” Office Action, page 8, lines 16 - 18. However, the Appellant did not argue merely as to whether Haruch discloses a flat spray. Rather Appellant has consistently argued that Haruch does not disclose a method or apparatus which directs a plurality of single jets from a plurality of orifices so that they intersect one another to form a single uniform jet having a flat curtain like shape.

The Abstract of Haruch recites “[t]he orifices preferably are inclined so as to produce a converging spray but can be inclined to produce a diverging spray or a substantially flat spray.”

This does not teach or suggest the claimed plurality of jets which intersect each other to form a flat curtain like shape. On the contrary, this reference to a substantially flat spray teaches that the converting spray of Haruch is an alternative to a diverging spray or a converging spray. Reference to Figs. 1 - 6 of the Haruch patent supports this view wherein Figs. 5 and 6, for example, show a pair of parallel orifices which could form a flat spray without converging to form a flat curtain like shape as claimed.

For at least the reason that no combination of Haruch and Relyea teaches or suggests “directing a plurality of single jets expelled from the orifices so that they intersect one another to form a single uniform jet having a flat curtain-like shape” as particularly claimed, Appellant respectfully submits that the rejections of claims 1-6, and 14-15 under 35 U.S.C. §103(a) are improper and should be withdrawn.

B. Persons Having Ordinary Skill in the Art of Firefighting Would Not Be Motivated to Combine Relyea with Haruch.

In the Final Office Action, the Examiner cited col. 3, lines 15 – 20 to assert that a motivation to combine Relyea Haruch would be “to increase the efficiency of the apparatus.” Office Action, page 3, line 12. Appellant respectfully submits that the recited increased efficiency has nothing to do with “a method of firefighting” as claimed and would not increase the efficiency of firefighting. Rather the cited portion of Haruch recites “[a]s a result of the finer atomization, effected by the multiple orifices, the efficiency of the apparatus 10 is increased in that a given volume of liquid may be broken into particles having a relatively high surface area even though steam is supplied to the apparatus at a comparatively low volumetric flow rate.” Col. 3, lines 15 – 20. While this may increase efficiency for use in Haruch’s field of “fluidized catalytic cracking” Appellant submits that increasing atomization of a liquid flow would not increase efficiency for the purpose of firefighting.

Appellant further submits that the rejections of claims 1-6, and 14-15 under 35 U.S.C. §103(a) are improper because Haruch is in the field of “fluidized catalytic cracking” which is not analogous to the field of firefighting. Nothing in Haruch suggests anything that might be beneficial to firefighting and persons having ordinary skill in the art would not look to Haruch or any other disclosure in the field of fluidized catalytic cracking in order to develop a method of

firefighting. Additionally, persons having ordinary skill in the art would not be motivated to combine Haruch with Relyea because Haruch relates to atomization of liquid hydrocarbon in catalytic cracking. (see Abstract). Since it is widely known that atomized liquid hydrocarbons are highly flammable, Haruch is non-analogous art which would not be considered by those in the field of firefighting. Reconsideration is respectfully requested.

C. The Rejections of Claims 7 and 10-13 Under 35 U.S.C. §103(a) are Improper Because None of the Additionally Cited References Cures the Deficiencies of Relyea and Haruch or Otherwise Teaches or Suggests Each and Every Claim Element.

The Examiner rejected claims 7-10 under 35 U.S.C. §103 over Relyea in view of U.S. Patent No. 3,913,845 to Tsuji (hereinafter “Tsuji”) and further in view of Haruch. Tsuji discloses “[a] fuel injection nozzle is disclosed in which a plurality of orifices or nozzle holes are formed through a nozzle head in such a way that the angles of spray are increased stepwise as the orifices are farther located from the center of the nozzle tip. The orifices may be arrayed in row or column or along one or a plurality of coaxial circles. The fuel-air or steam mixtures injected through the orifices will not interfere with each other so that a large number of independent small flames may be formed.” Abstract, emphasis added.

Appellant respectfully submits that Tsuji does not cure the deficiencies of Relyea and Haruch cited above with respect to the rejections of claims 1-6, and 14-15 under 35 U.S.C. §103(a) by teaching or suggesting “directing a plurality of single jets expelled from the orifices so that they intersect one another to form a single uniform jet having a flat curtain-like shape” as particularly claimed. Further, because Tsuji recites that “[t]he fuel-air or steam mixtures injected through the orifices will not interfere with each other” (Abstract), this combination also teaches away from Appellant’s invention in which a plurality of single jets are combined (i.e., interfere with each other) to form a single uniform jet.

For at least the reason that no combination of Relyea, Haruch and Tsuji teaches or suggests each and every element of claims 7 – 10, Appellant respectfully submits that the rejections of claims 7 – 10 under 35 U.S.C. §103 are improper and should be withdrawn. Reconsideration is respectfully requested.

The Examiner rejected claim 11 under 35 U.S.C. §103(a) over Relyea in view of Tsuji and Haruch and U.S. Patent No. 2,246,797 to Geddes et al. (hereinafter “Geddes”) and rejected

claims 12 – 13 under 35 U.S.C. §103(a) over Relyea in view of Tsuji, Haruch, Geddes and U.S. Patent No. 4,435,891 to Nicholson et al. (hereinafter “Nicholson”).

Geddes describes a breaching nozzle for fire hose “whereby effective streams of water may almost instantaneously be introduced into the interior spaces of building structures to combat fires therein.” Col. 1, lines 2 – 6. Nicholson describes a fan spray nozzle machined in a wall of the water header to generate a desirable spray pattern. Col. 1, lines 29 – 31. Appellant respectfully submits that neither Geddes nor Nicholson cure the deficiencies of Relyea, Haruch and Tsuji described above by teaching or suggesting “a plurality of single jets expelled from the orifices so that they intersect one another to form a single uniform jet having a flat curtain-like shape” as claimed.

For at least the reason that no combination of Relyea, Tsuji, Haruch, Geddes and/or Nicholson teaches or suggests each and every element of claims 11, 12 or 13, Appellant respectfully submits that the rejections of claims 11 – 13 under 35 U.S.C. §103 are improper and should be withdrawn.

Further, Appellant respectfully submits that Nicholson relates to the field of spray nozzles used in conjunction with a pipe or tube that serves as a water header, wherein “[t]he nozzle provided herein has potential utility within a cheese filter, but other uses are also contemplated.” Col. 1, lines 9 – 11 and 33 – 35. Appellant submits that Nicholson’s device with utility in food processing is non-analogous art with respect to the instant field of firefighting nozzles. Persons having ordinary skill in the art of firefighting would not be motivated to look to the field of food processing to develop a nozzle which would provide a uniform jet having flat curtain like shape as claimed which is particularly designed for firefighting. Reconsideration is respectfully requested.

VIII. CONCLUSION

Claims 1-15 are currently pending in the present application. Each of the independent claims requires at least an element of directing a plurality of single jets expelled from the orifices so that they intersect one another to form a single uniform jet having a flat curtain-like shape. No combination of the cited references teaches or suggests this claim element. Even if, arguendo, each element of the claims were to be found in the cited references, persons having ordinary skill in the art would not be motivated to combine a firefighting method and apparatus with the cited references to methods and apparatus for catalytic cracking such as U.S. Patent No. 5921472 to Haruch. For at least these reasons, Appellant respectfully submits that all of the pending rejections of claims 1 - 15 are improper and should be overturned. Reconsideration and allowance of claims 1 - 15 is respectfully requested.

Respectfully submitted,

By: /s/Joseph P. Quinn/
Joseph P. Quinn
Reg. No. 45209

Seyfarth Shaw LLP
Two Seaport Lane
Suite 300
Boston MA 02210-2028
Telephone: 617-946-4833
Fax: 617-946-4801
email: bosippto@seyfarth.com

IX. CLAIMS APPENDIX

1. A method for fire-fighting, the method comprising:

piercing a shell of a burning object by pushing at least one elongated piercing tool arranged in a rescue boom from the side of a first surface of the shell to the side of a second surface thereof,

feeding, along at least one longitudinal channel in the piercing tool, a fire extinguishing medium to a nozzle provided in the piercing tool,

spraying the fire extinguishing medium to the side of the second surface of the shell through a plurality of orifices provided in the nozzle ,

and directing a plurality of single jets expelled from the orifices so that they intersect one another to form a single uniform jet having a flat curtain-like shape.
2. A method as claimed in claim 1, comprising

using said jet in order to confine a seat of fire.
3. A method as claimed in claim 1, comprising

turning the nozzle around the longitudinal axis of the piercing tool in order to turn the curtain-like jet.
4. A method as claimed in claim 1, comprising

turning the piercing tool around its longitudinal axis in order to turn the curtain-like jet.

5. A rescue boom comprising:
 - a boom provided with at least one movable boom part connected to a base,
 - at least one piercing tool arranged at a free end of the boom, the piercing tool being an elongated piece comprising at least one longitudinal channel,
 - at least one actuator for moving the piercing tool in the longitudinal direction of the piercing tool with respect to an outermost end of the boom,
 - at least one feed channel for feeding a fire extinguishing medium to the channel in the piercing tool,
 - at least one nozzle, which is an elongated piece and which is connected to the channel in the piercing tool, the fire extinguishing medium being arranged to be fed through a plurality of orifices provided in the nozzle,
 - and wherein the longitudinal cross section of the nozzle, the orifices in the nozzle are arranged to pass via substantially the same imaginary plane so that the fire extinguishing medium fed through the orifices forms a plurality of single jets which intersect one another to form a single uniform jet having a flat curtain-like shape.

6. A rescue boom as claimed in claim 5, wherein
means are provided in connection with the piercing tool for turning the curtain-like jet
expelled from the nozzle with respect to the longitudinal axis of the piercing tool.

7. A nozzle of a piercing tool for spraying a fire extinguishing medium, the nozzle
being an elongated piece having a front end and a rear end and the nozzle comprising:
fastening means at the rear end of the nozzle for fastening the nozzle to the piercing tool,
at least one feed channel for feeding a fire extinguishing medium to the nozzle,
a plurality of orifices extending from the feed channel to an outer surface of the nozzle,
the orifices being directed obliquely forwards such that the farther away from the front end of the
nozzle a single orifice resides, the larger an acute angle between the middle axis of the orifice
and the middle axis of the nozzle;

and wherein the longitudinal cross section of the nozzle, the orifices are arranged to pass
via substantially the same imaginary plane so that the fire extinguishing medium fed through the
orifices forms a plurality of single jets which intersect one another to form a single uniform jet
having a flat curtain-like shape.

8. A nozzle as claimed in claim 7, wherein
the cross section of the single orifices in the nozzle is dimensioned to be the larger the
smaller the angle between the middle axis of the orifice and the middle axis of the nozzle so that
the curtain-like jet is arranged to extend to a larger distance at the front of the nozzle than on the
sides of the nozzle.

9. A nozzle as claimed in claim 7, wherein
the nozzle is a sleeve-like piece,
and the front end of the nozzle is provided with connecting means for fastening a separate
tip piece.

10. A nozzle as claimed in claim 7, wherein
in the longitudinal cross section of the nozzle, the orifices are arranged successively in a
first line of orifices and in a second line of orifices, and
the first line of orifices resides on a first side of the middle axis of the nozzle while the
second line of orifices resides on a second side of the middle axis thereof so that the nozzle is
arranged to form a uniform, curtain-like jet extending to the sides and to the front of the nozzle.

11. A nozzle as claimed in claim 7, wherein
in the longitudinal cross section of the nozzle, the orifices are arranged successively in a
first line of orifices and in a second line of orifices,
and the first line of orifices resides on a first side of the middle axis of the nozzle while
the second line of orifices resides on a second side of the middle axis thereof so that the nozzle is
arranged to form a uniform, curtain-like jet extending to the sides and to the front of the nozzle,
and the outer surface of the nozzle is provided with at least one longitudinal groove at the
first line of orifices and at least one longitudinal groove at the second line of orifices.

12. A nozzle as claimed in claim 7, wherein
in the longitudinal cross section of the nozzle, the orifices are arranged successively in a
first line of orifices and in a second line of orifices,

and the first line of orifices resides on a first side of the middle axis of the nozzle while the second line of orifices resides on a second side of the middle axis thereof so that the nozzle is arranged to form a uniform, curtain-like jet extending to the sides and to the front of the nozzle,

and the outer surface of the nozzle is provided with at least one longitudinal groove at the first line of orifices and at least one longitudinal groove at the second line of orifices,

and two longitudinal grooves are provided successively both at the first line of orifices and at the second line of orifices,

and as seen from the front end of the nozzle, the first grooves extend to a section of the first orifices as seen from the front end of the nozzle only.

13. A nozzle as claimed in claim 7, wherein

in the longitudinal cross section of the nozzle, the orifices are arranged successively in a first line of orifices and in a second line of orifices,

and the first line of orifices resides on a first side of the middle axis of the nozzle while the second line of orifices resides on a second side of the middle axis thereof so that the nozzle is arranged to form a uniform, curtain-like jet extending to the sides and to the front of the nozzle,

and the outer surface of the nozzle is provided with at least one longitudinal groove at the first line of orifices and at least one longitudinal groove at the second line of orifices,

and the shape of the bottoms of the grooves in the outer surface of the nozzle is inwardly curved.

14. A method as claimed in claim 1, further comprising the step of extending a curtain-like flat jet to the front of the piercing tool.

15. A rescue boom as claimed in claim 5, wherein the orifices of the nozzle are directed obliquely forward.

X. EVIDENCE APPENDIX

Not Applicable.

X1. RELATED PROCEEDINGS INDEX

Not Applicable.